Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (withdrawn): A system for evaluating cardiac performance relative to performance of an intrathoracic pressure maneuver, comprising:

an implantable medical device to indirectly sense blood pressure by directly collecting intracardiac impedance measures; and

an analysis component to evaluate cardiac functional changes to the blood pressure in response to performance of an intrathoracic pressure maneuver.

2. (withdrawn): A system according to Claim 1, wherein the blood pressure comprises at least one of arterial pressure, cardiac chamber pressure, systolic pressure, and diastolic pressure.

3. (withdrawn): A system according to Claim 2, wherein the cardiac chamber pressure comprises left ventricular end diastolic pressure.

4. (withdrawn): A system according to Claim 1, wherein the implantable medical device comprises at least one of a bradycardia, tachycardia, heart failure, therapy delivery, and monitoring device.

5. (withdrawn): A system according to Claim 1, further comprising:

at least one lead to couple to the implantable medical device and to sense at least one of the intracardiac impedance measures across the thoracic cavity and the intracardiac impedance measures across the heart.

6. (withdrawn): A system according to Claim 1, wherein the intrathoracic pressure maneuver comprises at least one of a Valsalva and Müller maneuver.

7. (withdrawn): A system according to Claim 1, further comprising:
an evaluation subcomponent to evaluate at least one of overdamping and underdamping cardiac impedance response relative to normative levels.

8. (withdrawn): A system according to Claim 7, further comprising:
a notification subcomponent to generate a notification responsive to the at least one of overdamping and underdamping cardiac impedance response.

9. (withdrawn): A system according to Claim 1, wherein thoracic pressure is monitored during the intrathoracic pressure maneuver.

10. (withdrawn): A system according to Claim 9, further comprising:
an external pressure monitor to define a confined volume configured to receive a forced exhalation and to measure the thoracic pressure relative to the confined volume.

11. (withdrawn): A system according to Claim 9, further comprising:
a thoracic pressure sensor to internally measure thoracic pressure.

12. (withdrawn): A method for evaluating cardiac performance relative to performance of an intrathoracic pressure maneuver, comprising:
indirectly sensing blood pressure by directly collecting intracardiac impedance measures through an implantable medical device; and
evaluating cardiac functional changes to the blood pressure in response to performance of an intrathoracic pressure maneuver.

13. (withdrawn): A method according to Claim 12, wherein the blood pressure comprises at least one of arterial pressure, cardiac chamber pressure, systolic pressure, and diastolic pressure.

14. (withdrawn): A method according to Claim 13, wherein the cardiac chamber pressure comprises left ventricular end diastolic pressure.

15. (withdrawn): A method according to Claim 12, wherein the implantable medical device comprises at least one of a bradycardia, tachycardia, heart failure, therapy delivery, and monitoring device.

16. (withdrawn): A method according to Claim 12, further comprising: sensing at least one of the intracardiac impedance measures across the thoracic cavity and the intracardiac impedance measures across the heart.

17. (withdrawn): A method according to Claim 12, wherein the intrathoracic pressure maneuver comprises at least one of a Valsalva and Müller maneuver.

18. (withdrawn): A method according to Claim 12, further comprising: evaluating at least one of overdamping and underdamping cardiac impedance response relative to normative levels.

19. (withdrawn): A method according to Claim 18, further comprising: generating a notification responsive to the at least one of overdamping and underdamping cardiac impedance response.

20. (withdrawn): A method according to Claim 12, further comprising: monitoring thoracic pressure during the intrathoracic pressure maneuver.

21. (withdrawn): A method according to Claim 20, further comprising: defining a confined volume configured to receive a forced exhalation; and measuring the thoracic pressure relative to the confined volume.

22. (withdrawn): A method according to Claim 20, further comprising: internally measuring thoracic pressure.

23. (withdrawn): An apparatus for evaluating cardiac performance relative to performance of an intrathoracic pressure maneuver, comprising:

means for indirectly sensing blood pressure by directly collecting intracardiac impedance measures through an implantable medical device; and

means for evaluating cardiac functional changes to the blood pressure in response to performance of an intrathoracic pressure maneuver.

24. (currently amended): A system for assessing cardiac performance through transcardiac impedance monitoring, comprising:

an implantable medical device to directly collect intracardiac impedance measures;

a correlation component to correlate the intracardiac impedance measures to cardiac ~~dimensional~~ pressure measures relative to performance of an intrathoracic pressure maneuver and to group the cardiac ~~dimensional~~ pressure measures into at least one measures set corresponding to a temporal phase of the intrathoracic pressure maneuver; and

an analysis component to evaluate the at least one cardiac ~~dimensional~~ pressure measures set against a cardiac ~~dimensional~~ pressure trend for the corresponding intrathoracic pressure maneuver temporal phase to represent cardiac performance.

25. (currently amended): A system according to Claim 24, wherein the cardiac ~~dimensional~~ pressure measures comprise at least one of cardiac stroke volume, left ventricular ejection fraction, left ventricular end diastolic ~~dimension,~~ pressure, and left ventricular end systolic ~~dimension.~~ pressure.

26. (original): A system according to Claim 24, further comprising:

a history subcomponent to evaluate a history of cardiac performance representations; and

a trending subcomponent to recognize a trend within the history indicating at least one of cardiovascular disease absence, onset, progression, regression, and status quo.

27. (currently amended): A system according to Claim 24, further comprising:

a characteristic signature formed with the cardiac ~~dimensional~~ pressure trends over the performance of the intrathoracic pressure maneuver; and

a comparison subcomponent to compare an overall cardiac ~~dimensional~~ pressure profile comprising the at least one cardiac ~~dimensional~~ pressure measures set to the characteristic signature to form a cardiac performance assessment.

28. (original): A system according to Claim 27, further comprising:

a predefined threshold with the comparison module to analyze the cardiac performance assessment relative to the predefined threshold.

29. (original): A system according to Claim 28, further comprising:

a notification generated responsive to the cardiac performance assessment substantially non-complying to the predefined threshold.

30. (original): A system according to Claim 24, wherein the intrathoracic pressure maneuver comprises the Valsalva maneuver, further comprising:

a collection subcomponent to collect the intracardiac impedance measures relative to performance of the Valsalva maneuver.

31. (original): A system according to Claim 30, further comprising:

a phase subcomponent to specify four phases physiologically corresponding to the performance of the Valsalva maneuver, comprising defining Phase I corresponding to initial strain, defining Phase II corresponding to strain duration and cessation of breathing, defining Phase III corresponding to strain discontinuation and resumption of normal breathing, and defining Phase IV corresponding to recovery.

32. (currently amended): A system according to Claim 31, further comprising:

a trending subcomponent to identify an overshoot of the cardiac ~~dimensional~~ pressure during the Phase IV.

33. (currently amended): A system according to Claim 32, wherein the trending subcomponent further comprises identifying an increase of the cardiac ~~dimensional~~ pressure during the Phase I, identifying a transient decrease of the cardiac ~~dimensional~~ pressure during the Phase II, identifying a sharp decrease of the cardiac ~~dimensional~~ pressure during the Phase III, and identifying an increase preceding the overshoot and a decrease of the cardiac ~~dimensional~~ pressure during the Phase IV.

34. (original): A system according to Claim 24, further comprising:

a programming subcomponent to provide programming support to the implantable medical device.

35. (original): A system according to Claim 24, wherein the implantable medical device comprises at least one of an implantable cardiac pacemaker, implantable cardioverter defibrillator, implantable cardiac resynchronization device, implantable cardiovascular monitor, and therapeutic device monitoring and treating structural problems of the heart.

36. (original): A system according to Claim 24, further comprising:

a database to maintain the intracardiac impedance measures.

37. (original): A system according to Claim 24, wherein the intrathoracic pressure maneuver comprises at least one of the Valsalva maneuver and Müller maneuver.

38. (currently amended): A method for assessing cardiac performance through transcardiac impedance monitoring, comprising:

directly collecting intracardiac impedance measures through an implantable medical device;

correlating the intracardiac impedance measures to cardiac ~~dimensional~~ pressure measures relative to performance of an intrathoracic pressure maneuver;

grouping the cardiac ~~dimensional~~ pressure measures into at least one measures set corresponding to a temporal phase of the intrathoracic pressure maneuver; and

evaluating the at least one cardiac ~~dimensional~~ pressure measures set against a cardiac ~~dimensional~~ pressure trend for the corresponding intrathoracic pressure maneuver temporal phase to represent cardiac performance.

39. (currently amended): A method according to Claim 38, wherein the cardiac ~~dimensional~~ pressure measures comprise at least one of cardiac stroke volume, left ventricular ejection fraction, left ventricular end diastolic ~~dimension,~~ pressure, and left ventricular end systolic ~~dimension.~~ pressure.

40. (original): A method according to Claim 38, further comprising:

evaluating a history of cardiac performance representations; and

recognizing a trend within the history indicating at least one of cardiovascular disease absence, onset, progression, regression, and status quo.

41. (currently amended): A method according to Claim 38, further comprising:

forming a characteristic signature with the cardiac ~~dimensional~~ pressure trends over the performance of the intrathoracic pressure maneuver; and

comparing an overall cardiac ~~dimensional~~ pressure profile comprising the at least one cardiac ~~dimensional~~ pressure measures set to the characteristic signature to form a cardiac performance assessment.

42. (original): A method according to Claim 41, further comprising:

analyzing the cardiac performance assessment relative to a predefined threshold.

43. (original): A method according to Claim 42, further comprising:

generating a notification responsive to the cardiac performance assessment substantially non-complying to the predefined threshold.

44. (original): A method according to Claim 38, wherein the intrathoracic pressure maneuver comprises the Valsalva maneuver, further comprising:

collecting the intracardiac impedance measures relative to performance of the Valsalva maneuver.

45. (original): A method according to Claim 44, further comprising:

specifying four phases physiologically corresponding to the performance of the Valsalva maneuver, comprising:

defining Phase I corresponding to initial strain;

defining Phase II corresponding to strain duration and cessation of breathing;

defining Phase III corresponding to strain discontinuation and resumption of normal breathing; and

defining Phase IV corresponding to recovery.

46. (currently amended): A method according to Claim 45, further comprising:

identifying an overshoot of the cardiac ~~dimensional~~ pressure during the Phase IV.

47. (currently amended): A method according to Claim 46, further comprising:

identifying an increase of the cardiac ~~dimensional~~ pressure during the Phase I;

identifying a transient decrease of the cardiac ~~dimensional~~ pressure during the Phase II;

identifying a sharp decrease of the cardiac ~~dimensional~~ pressure during the Phase III; and

identifying an increase preceding the overshoot and a decrease of the cardiac ~~dimensional~~ pressure during the Phase IV.

48. (original): A method according to Claim 38, further comprising:

providing programming support to the implantable medical device.

49. (original): A method according to Claim 38, wherein the implantable medical device comprises at least one of an implantable cardiac pacemaker, implantable cardioverter defibrillator, implantable cardiac resynchronization device, implantable cardiovascular monitor, and therapeutic device monitoring and treating structural problems of the heart.

50. (original): A method according to Claim 38, further comprising:

maintaining the intracardiac impedance measures in a database.

51. (original): A method according to Claim 38, wherein the intrathoracic pressure maneuver comprises at least one of the Valsalva maneuver and Müller maneuver.

52. (currently amended): An apparatus for assessing cardiac performance through transcardiac impedance monitoring, comprising:

means for directly collecting intracardiac impedance measures through an implantable medical device;

means for correlating the intracardiac impedance measures to cardiac ~~dimensional~~ pressure measures relative to performance of an intrathoracic pressure maneuver;

means for grouping the cardiac ~~dimensional~~ pressure measures into at least one measures set corresponding to a temporal phase of the intrathoracic pressure maneuver; and

means for evaluating the at least one cardiac ~~dimensional~~ pressure measures set against a cardiac ~~dimensional~~ pressure trend for the corresponding intrathoracic pressure maneuver temporal phase to represent cardiac performance.